perseverance, hope, and clods endeavoured to stop their roarings. This was in 1833.

Long lists and descriptions are given of various plants having an economic value, amongst which we note indigo and other dye plants, fibre plants, paper plants, oil plants, tobacco, coffee, &c., together with some account of forest trees.

The description of the savages is derived from the work of Mr. Y. Ino, who devoted several years to their study. Eight groups are referred to, and for each of these an account is given of their dwellings, dress, ornaments, food, diseases, head-hunting, language, and generally on subjects of anthropological interest. All we have bearing upon zoology is a list of land birds by J. D. de la Touche, and a list of mammalia by the late Mr. Robert Swinoe, the latter, unfortunately, only bringing us up to 1872. Meteorology and seismology are referred to in a short appendix, but about geology Mr. Davidson is practically silent.

With this and a few other exceptions the work is encyclopædic in its character, and it may well be recommended to commercial and scientific men who search for information about the island of Formosa.

THE BASIS OF PLANT-SURGERY.

Pathologische Pflanzenanatomie. By Dr. Ernst Küster. Pp. 300, and index. (Jena: G. Fischer, 1903.) Price 8 marks.

THAT plants have their diseases is a truth that has forced itself more and more on this colonial empire of ours, and that the signs of disease frequently express themselves in abnormal structures and outgrowths is well known to those few experts who have to deal with the galls, cankers, pustules, tumours, and other "malignant" tissue-formations, the very names of which remind us of the ills to which flesh is heir.

Moreover, there is a surgery of plants, as well as of animals, and the true basis of this growing art is in both cases a thorough understanding of the pathological, or diseased, as well as of the normal or healthy anatomy of the patient.

This scientific basis of a refined art is the subject of the work before us.

The author of this treatise had already distinguished himself in Münich by his work on the anatomy of galls, and it is with the greatest satisfaction that we find him inaugurating his career at Halle by a thorough exploration of what is to a large extent a practically new theme, and one, moreover, so worthy of the traditions of his present post, for it is remarkable that, while we have several modern books on physiological anatomy and on the pathology of plants, no competent botanist has given us a detailed and comprehensive treatise on this now important and rapidly extending subject.

Küster's book consists of 300 pp. of excellent and clearly-written matter, illustrated by 121 figures not always worthy of his text, though never obscure or irrelevant.

He divides his subject into six chapters, of which five are devoted to technical and special descriptive anatomy as modified from the normal by pathological changes in the life-work of the tissues and cells, while the sixth is told off to do duty as a general account of the pathological processes themselves, and of what little theory we as yet possess on the subject.

Much as we admire the collection of anatomical facts, and the descriptions of morbid anatomy in special cases, comprised in these first five chapters, it must be evident that the subdivisions are somewhat unfortunate. The author himself apparently sees this, as is evinced by the uncertainty as to which heading certain cases shall be placed under, and we believe that the shortcomings are partly due to a somewhat slavish following of the terminology of the animal pathologists.

These headings are:—I. *Restitution,* under which are placed cases in which changes in growth, induced by sections and wounds, lead to the new formation of the cut-off parts, or to proliferations of various kinds.

II. *Hypoplasie,* or arrested development of organs or parts due to various inhibiting reactions, which bring about diminutions in the number or sizes of cells, or otherwise change the tissues so that they stop short of a stage of development which would normally be regarded as complete.

III. *Metaplasie,* or progressive changes due to overstimulations which result in the cells and tissues undergoing structural changes in excess of the normal, though not suffering the enlargements or increase in numbers dealt with under the next and the fifth heading.

IV. *Hypertrophie,* where the cells attain dimensions more or less inordinate, and due to excessive growth while young and turgid. Most galls—in the widest sense—afford examples of these cases, which are extremely common.

V. *Hyperplasie,* or those abnormalities—usually enlargements and distortions—which owe their origin to inordinate increase in the average numbers of cells.

It is, of course, impossible to discuss examples of these various cases of abnormal anatomy here, and we have already expressed our satisfaction with the general subject-matter. We may note in passing that while Miss Dale's beautiful work on "Intumescences" is properly acknowledged, and one of her excellent illustrations suitably used on p. 86, the best results of her ingenious experiments on the kind of light which induces these abnormalities are not adequately given or apparently apprehended in the summary on p. 87.

To most readers, however, it will be the subject-matter of chapter vi. which will prove most attractive, though there is disappointment in store for anyone who expects anything beyond the most sketchy survey of the factors concerned in ætiology and development and their bearing on pathology. The sections on stimuli and reactions seem to us particularly weak, and the conclusion that any tissue can give rise to any tissue element—"aus jeden Gewebe kann alles werden"—may appear too lightly arrived at unless the reader is acquainted with the somewhat voluminous literature. The same, perhaps, applies to Küster's conclusion that tissue-elements quite foreign to the

species may arise in a pathological structure, though in our opinion he establishes his contention.

The book is undoubtedly a stirring contribution to botanical science, and ought to stimulate research in many directions, and although it escapes the responsibilities of being a great work, it is certainly one that must be on the shelves of every investigator of first rank who has anything to do with the anatomy or pathology of plants. We cordially welcome this interesting book as a pioneer work of what will grow to be an immense subject.

COMETS AND THEIR TAILS.

Comets and their Tails, and the Gegenschein Light. By Frederick G. Shaw. Pp. 70. (London: Baillière, Tindall, and Cox, 1903.)

THE theory of comet's tails has not yet arrived at its ultimate destiny, which we suppose is that of becoming an orthodox branch of applied mathematics; and consequently it still possesses a fascination for the world at large. True, the phenomena have been discussed by Prof. Bredichin, in a succession of papers that now go back nearly thirty years; but the origin of the forces required for Bredichin's theory is very obscure, and the net result is to excite rather than to remove conjecture. During the last few years the general mental ferment over the new views of the constitution of matter has given a fresh stimulus to speculators in this part of astronomy, and a considerable literature has already gathered round the suggestions of J. J. Thomson, Arrhenius and Deslandres.

Mr. Shaw, whose book now lies before us, is not a follower of any of these schools; he holds that the comet's tail is caused by the rays of the sun being altered (by concentration and refraction) by their passage through the cometic atmosphere, and thus rendered more capable of being reflected from the meteoric matter in the neighbourhood. In other words, the tail does not really exist; it is merely a local illumination of the general circumambient dust of space. The idea bears some resemblance to the now frequently accepted explanation of the lighting-up of the Nova Persei nebula.

After stating this theory, and offering a general justification, the author proceeds to examine the records of the great comet of 1858 in the light of it. For this purpose he uses G. P. Bond's monograph to a considerable extent, a mistake which occurs in the first plate of the Harvard astronomer's account being unfortunately twice reproduced; the point chiefly dwelt on is the sympathy between the phenomena of the nucleus and those of the tail.

The work as a whole is brief, its tone is very modest, and it is not claimed that the theory has been worked out in detail. It is therefore scarcely fair to blame the author for the difficulty which one finds in attempting to explain by causes of this kind the singularly complex character of cometary appendages. But any theory of the kind must offer some explanation of their most constant and remarkable features, such as the multiplicity of tails, their curvature, and the "broken" appearances often seen; and it may be doubted whether the author's theory in its present state is capable of meeting these demands. "So-called secondary tails, &c.," he accounts for "by irregular ebullitions of gas from the comet," presumably giving rise to special fields of refracted rays.

But at the root of the whole matter lies the question of whether refraction in the cometic envelope is likely to take place at all on a scale comparable with that required by Mr. Shaw's hypothesis, and at present observation seems to negative this possibility.

The latter part of the book is devoted to the Gegenschein, for which a similar explanation is given—the refraction being in this case produced by the earth's atmosphere, and the phenomenon being due to the reflection of this refracted light from meteoric dust. An interesting criticism of Barnard's views is given.

OUR BOOK SHELF.

Physical Chemistry for Physicians and Biologists. By Ernst Cohen. Authorised Translation from the German by M. H. Fischer. Pp. ix+343. (New York: Henry Holt and Co., 1903.)

PHYSIOLOGISTS and pharmacologists have from the first been ready to adopt and apply the recent theories of physical chemistry. Indeed, the eagerness with which these theories have been received by biologists has frequently led to their misapplication, inasmuch as the conditions existing in the animal organism are so widely different from those for which the theories were developed, that direct adoption of purely physicochemical results is in nine cases out of ten inadmissible. In the book before us we have a series of seventeen lectures delivered by an energetic worker in pure physical chemistry to an audience of physicians. The physicochemical principles bearing on biological problems are expounded, the chief methods of experiment adequately described, and, what is of most importance, a critical account is given of many of their applications. These applications include, for example, disinfection in the light of the theory of electrolytic dissociation, the pharmacology of complex mercury salts and of uric acid solvents from the same point of view, the taste of dilute solutions, osmotic analysis, and the toxicity of electrolytic solutions. The book is admirably adapted to its purpose, and may be heartily recommended.

Trapper "Jim." By Edwyn Sandys. Pp. ix+441; illustrated. (New York and London: Macmillan and Co., Ltd., 1903.) Price 6s. net.

ALTHOUGH, as indicated by its title, this admirable little volume is devoted rather to sport and trapping than to natural history, yet it contains scattered through its pages such excellent descriptions of the wild life of the United States that the naturalist cannot fail to find much valuable information with regard to the habits of many of the mammals and birds mentioned. Specially interesting are the notes on the various species of American hares, and it will come as a revelation to many that the so-called "jack-rabbit" (*Lepus callotis*) is probably the fleetest member of all its tribe. Many references are made to the need for the cultivation of a true sporting instinct among hunters, that is to say, to the enjoyment of the sport itself, as distinct from making a "big bag." The name of Mr. Sandys is too well known as a writer on the sport and popular natural history of North America to stand in need of any commendation on our part, but we may safely say that his popularity will certainly be enhanced by his latest effort. R. L.